

Mathematics education in Second Life

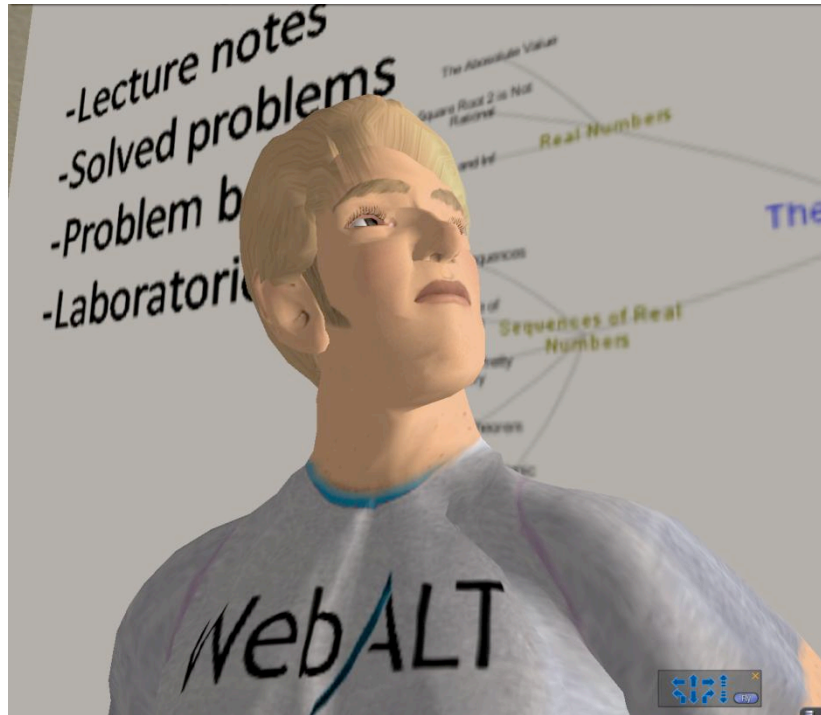
Olga Caprotti and Mika Seppälä

Department of Mathematics and Statistics

University of Helsinki

Meet our avatars

Akim Falta



Sybil Nemeth



Education in Virtual Worlds

- VW are social platforms
- empathic learning
- experiential learning:
 - real-life pretend situations
 - practice without consequences

Are virtual realities really suitable
for teaching and learning mathematics?

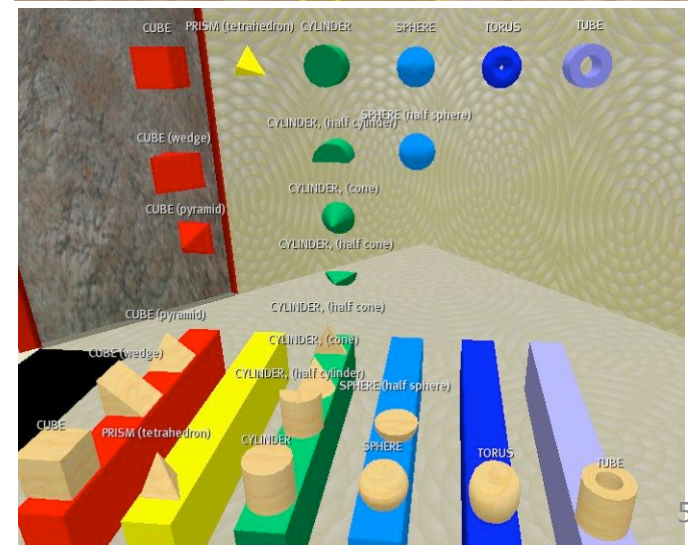
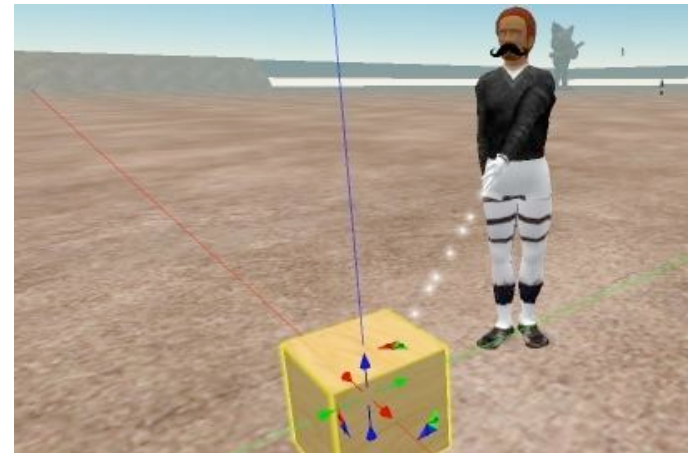
Virtual Worlds

- Second Life
 - privately owned
 - SL viewer is open source
 - [real economy](#)
 - [Institutions and Organizations](#)
- [OpenSimulator](#)
- [Open Croquet](#)
 - [Ancient Spaces](#)
- There.com
- [Protosphere](#)



Benefits of SL

- 3D browsing
 - gopher, mosaic, mozilla
- Simulation environment
 - objects obey laws of [physics](#)
 - artificial life ([swarms and flocks](#))
 - Ecosystems ([terminus](#))
- 3D modeling platform
 - primitives
 - scripts



Current limitations of SL

- no direct HTML, no MathML
- Powerpoints and PDF
 - have to be converted to bitmaps
 - can be uploaded at a cost
- streaming media is limited (1/parcel)
- no application sharing

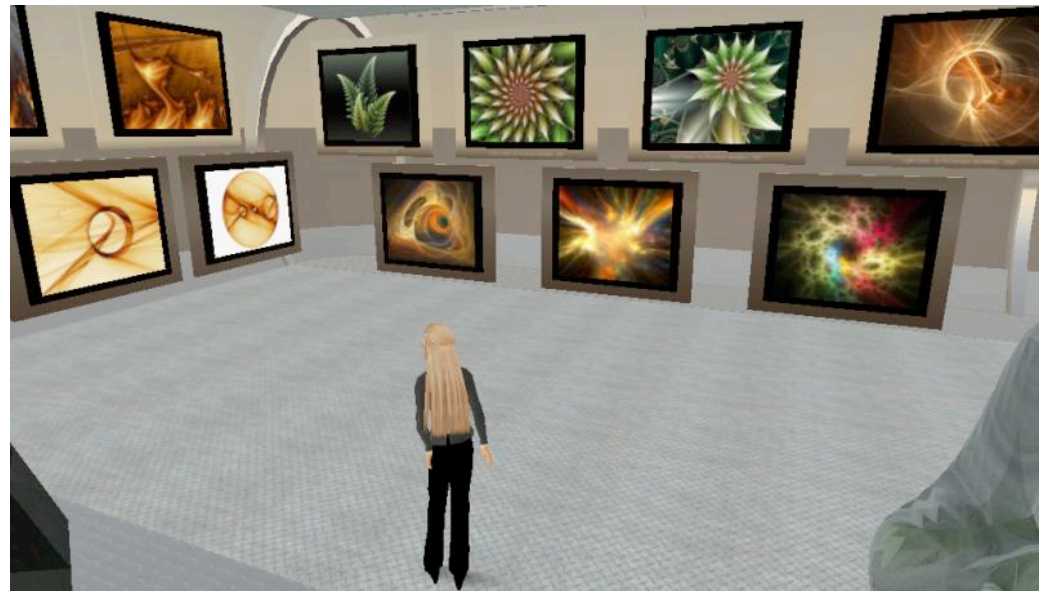
Mathematics in SL

- few hits (16)
- some colleges
- some sandboxes
- exhibitions



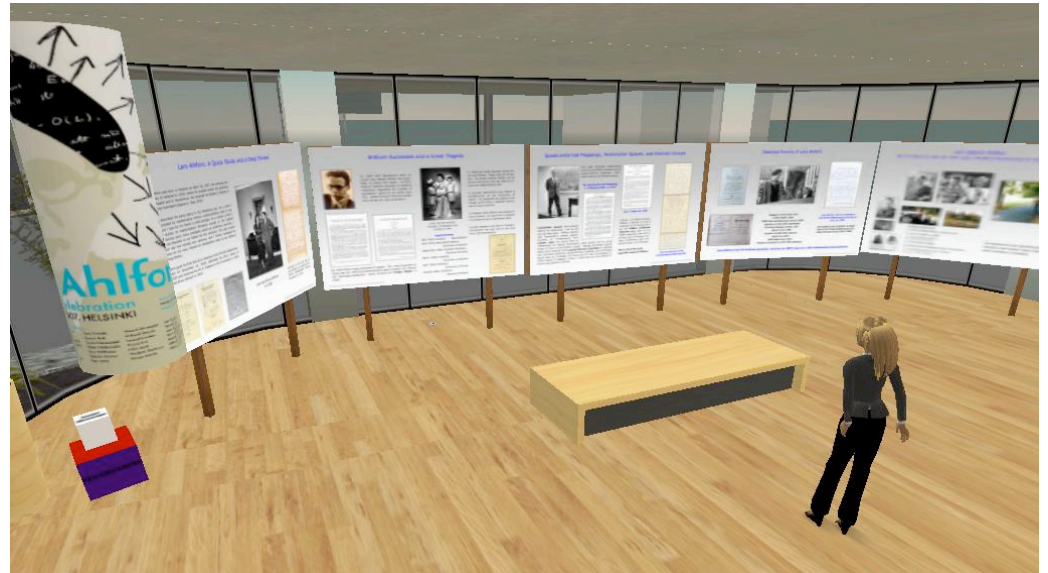
Exhibitions

Fractal Gallery



Lars Ahlfors Centennial Celebration

Posters: a virtual version of
those hanging at the
department



Mixed reality events

New and Emerging
Technologies in
Mathematics
Education,

Helsinki, 17-18 August 2007



Office meeting space

<http://slurl.com/secondlife/EdTech/68/62/39>

JEM & WebALT
presentation boards

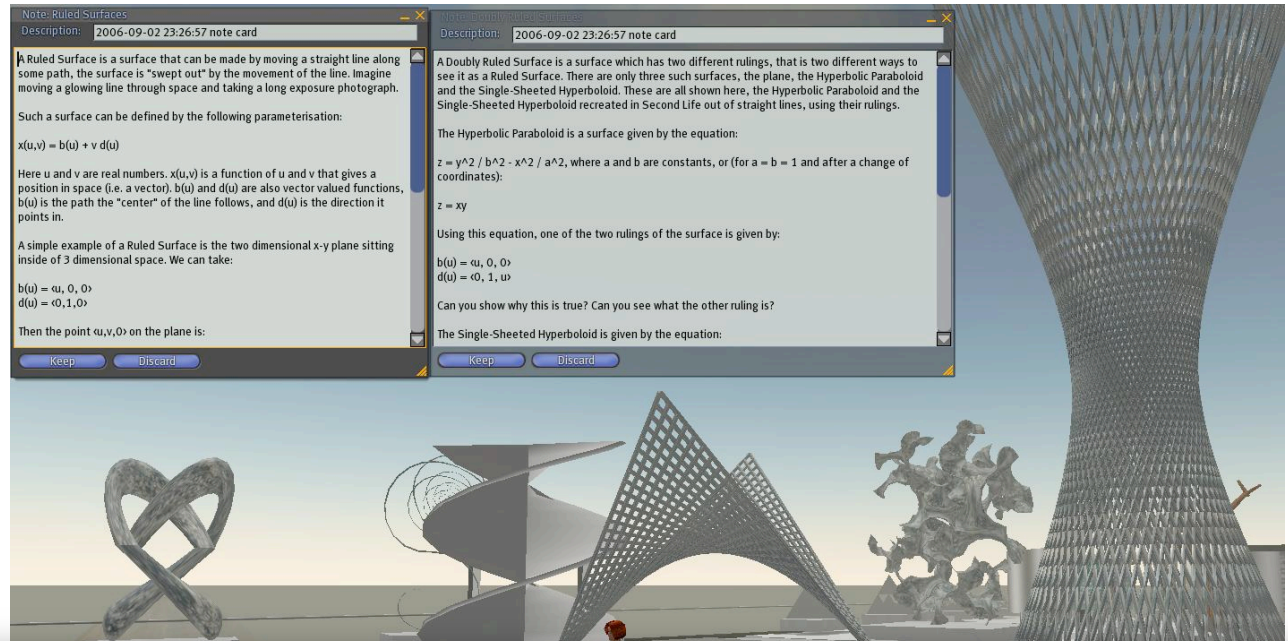


JEM office space in SL

- JEM Exhibition and presentation boards
 - display numbered images (10 L\$/image)
 - a slideshow (25 slides: 250 L\$ \approx 1 \$)
- Handouts
 - notecards: e.g. instructions on how to reach a web site
 - in-world items, e.g. a laptop, or a t-shirt
 - scripts: opens a URL in a browser, leave a message
- Sitting areas

Lectures

ASCII typesetting
no shared desktop
Slideshows still
cumbersome



The Hyperbolic Paraboloid is a surface given by the equation:

$z = y^2 / b^2 - x^2 / a^2$, where a and b are constants, or (for $a = b = 1$ and after a change of coordinates):

$$z = xy$$

Educational gaming
Experiential learning

Scavenger hunts

- Virtual, in SL:
 - Instructions are distributed in a notecard
 - Participants look for hidden objects or carry out tasks
 - Prizes

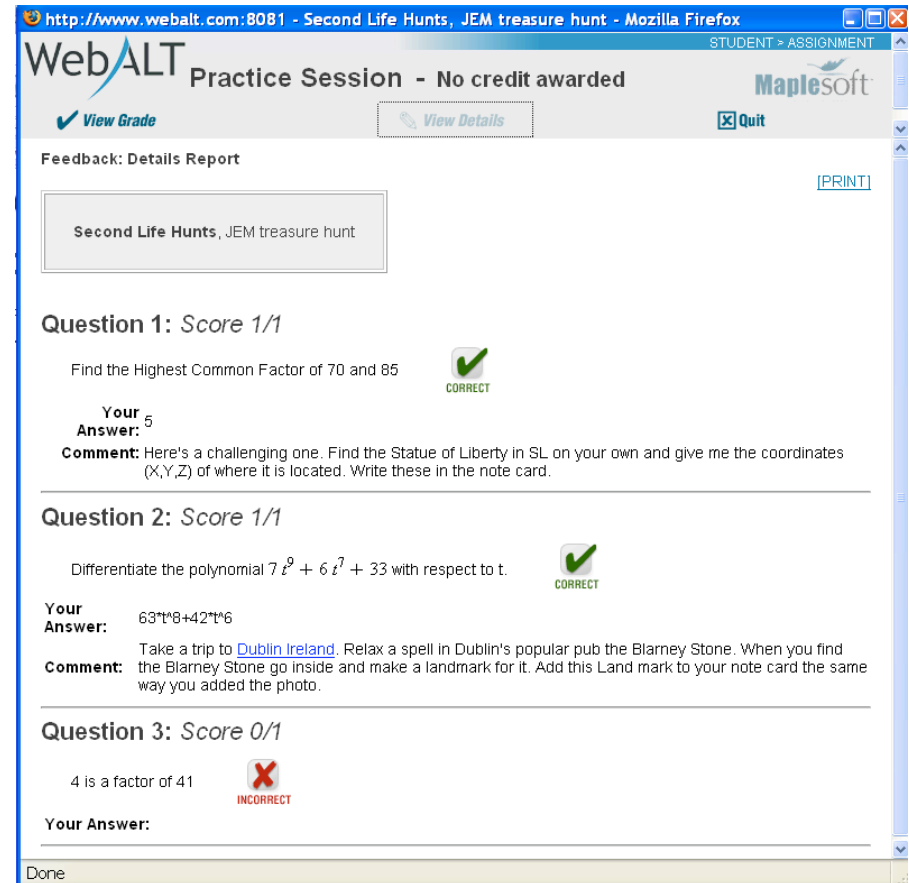
JEM SL treasure hunt:

- Instructions are delivered upon answering a MapleTA practice question correctly
- Mixed browser-SL client

Educational Maths Games

WebALT MapleTA
practice assignment
in which feedback is
given only if answer
is correct

Deliver instructions of
the scavenger hunt
using SLURLs in
feedbacks



Welcome to the JEM SL treasure hunt!

GOAL

In this treasure hunt, players will collect images and information to prove where they have been in SL according to instructions that are provided if they can complete correctly a mathematical question. Each player has to compile what he/she has collected in notecard form and return the notecard to Sybil Nemeth. The instructions will be displayed when clicking "View Details" after grading the answer.

TIME LIMIT

Starts: Wed. 6PM EET --- Ends: Sat. 6PM EET

Pizes Awarded: Mon. 6:30PM EET Winners will not be awarded or notified till this time.

ITEMS NEEDED TO PLAY

10L\$ needed for pictures which is supplied by Sybil Nemeth

HOW TO WIN GRAND PRIZE

Be the first turn in a notecard containing all the correct information.

PRIZE

Do not really know at this point. Linden dollars maybe or SL items like the JEM t-shirt.

RULES

- Be honest no sharing information.
- Use what you know about navigating in SL to find what you are looking for.
- All entries must be submitted in notecard form with all info contained in a notecard and numbered.

- You may start anywhere but keep the notecard numbers in the same order as the question who gave the instruction.

- Each person will be given 10L to cover pictures you will be taking. If you decide not to play or did not use the money please return it for use with future projects.

- Be sure to name the notecard with "your name"- JEM hunt.

TIPS

PLACING PICTURES/LANDMARKS/NOTECARDS INSIDE A NOTECARD

- Pictures: open your note card so you can read it. Open your inventory and drag the picture onto the open notecard it should attach itself.

- Landmarks: Open same as above, find the landmark in the land mark folder and drag it into the notecard.

- Notecards : Open the scavenger hunt notecard find the notecard you want to transfer into the other notecard but do not open this one. Drag it onto the open notecard. It should work just like the above did.

REVIEW ON PHOTO TAKING

When the Snapshot previewer comes up be sure the "upload a snapshot" is checked. This will put it in your inventory under pictures. If you save to hard drive you will have to upload it back into SL which will place it in the textures folder.

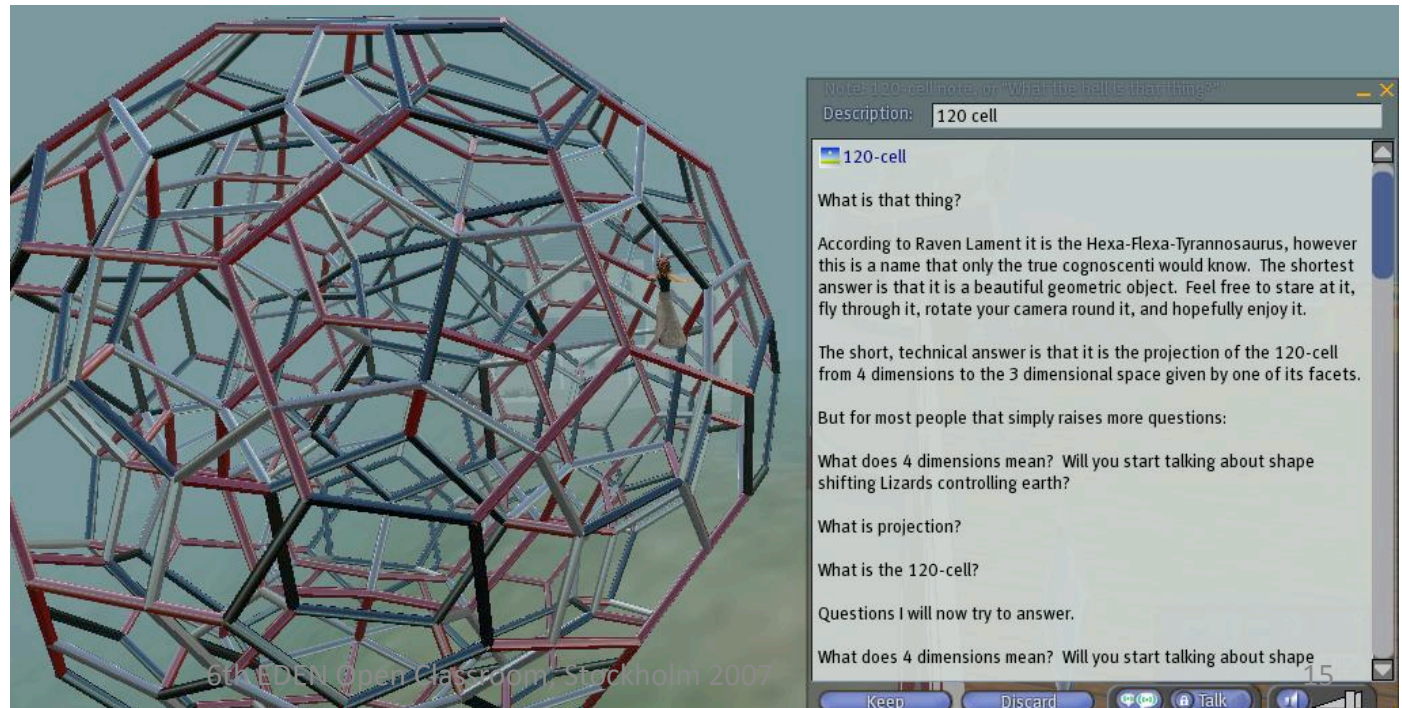
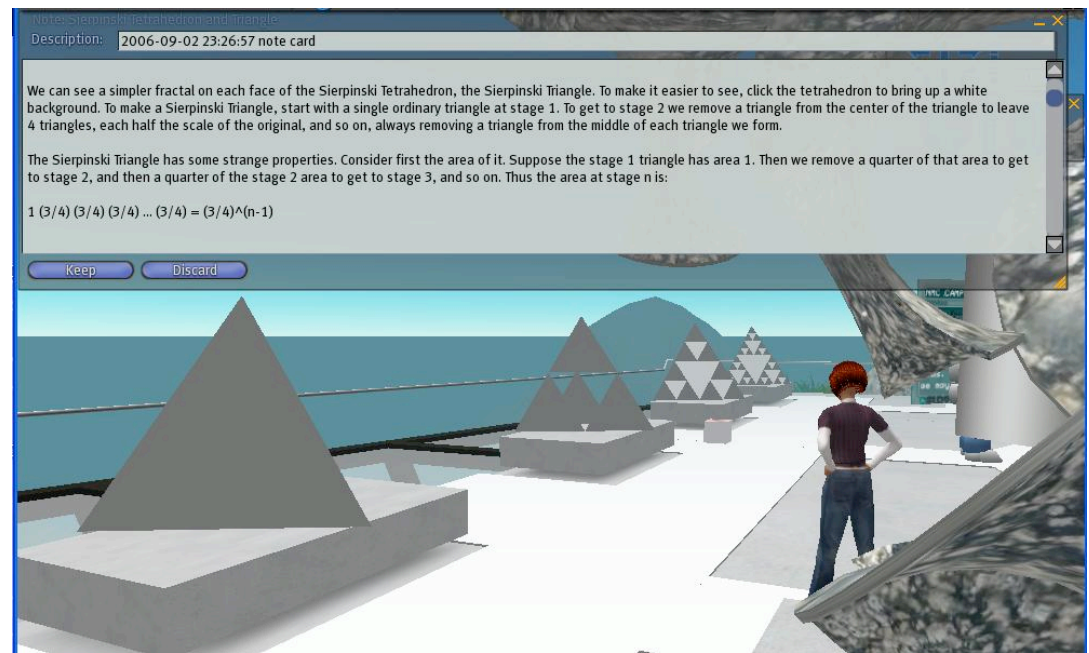
Always rename your photos or you will have bunch that just say snapshot. You rename them by finding them in your inventory right click/rename.

Experiential Mathematics

Guided explorations of visualizations of abstract mathematical objects and constructions

Textual notecards

- stimulate thinking
- reference resources



As a by-product of being a SL citizen:

- simulations: economic transactions are real
- operations in 3D: rotation, translation, scaling etc
- Vector calculus
- mathematical scripting (e.g. rotations)

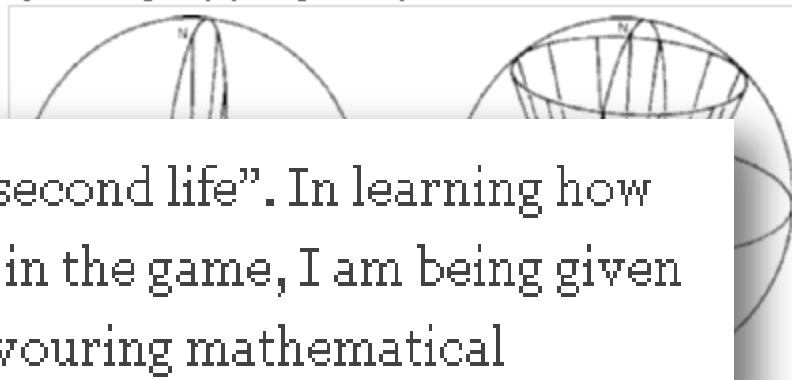
I now have a different meaning for “second life”. In learning how to create objects and to build things in the game, I am being given a second chance in life. I am now devouring mathematical formulae as if they were chocolate cake, and for the first time I’m experiencing the joys of geometry.

SATURDAY, AUGUST 11, 2007

A Second Life in More Ways than One

The online world Second Life is so named because its residents can lead a second life alongside their real one. Thus you can have two (or more) homes, and two wives or husbands, without going broke or to jail for bigamy. And in that second world everybody is young and all the women and all the homes are pretty – or as pretty as their creators can make them.

I now have a different meaning for “second life”. In learning how to create objects and to build things in the game, I am being given a second chance in life. I am now devouring mathematical formulae as if they were chocolate cake, and for the first time I’m experiencing the joys of geometry.



aptitudes ran to the arts and philosophy, and my brain reacted to numbers as if they were poison. I devised ingenious ways of avoiding required classes in mathematics and of getting through the courses I was forced to take without impeding my advancement to the next grade. I've never cheated, but strange

Conclusions

- Museum/exhibits/[exploratoriums](#) work well
- Design of engaging 3D learning activity in SL focusing on mathematics and not on SL is hard
- Socializing aspects have pros and cons
- Large potential for
 - team work
 - discussions
 - problem solving activities